

# ANALYSIS IN BLOOD OF GOLDEN HAMSTER BY NAA FOR CLINICAL PRACTICE

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In the present study Neutron Activation Analysis (NAA) technique has been used to determine, simultaneously, some element concentrations of clinical relevance in whole blood samples of Golden Hamster. The normal range for Br, Cl, K and Na concentrations were determined. The knowledge of these values permits clinical investigation of animal model using whole blood as well as to check the similarities with human blood.

**Keywords:** Golden Hamster, blood, NAA, reference value

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## INTRODUCTION

Animal experimentation is used in many research areas, mainly those related to life sciences. Particularly, in the health area, small-sized animals are currently used in investigations for new medicines and vaccines, as well as for medical diagnostic studies, before being tested on human beings. One of the commonly used animals is the Golden Hamster due its low cost and also for animal rights implications. In this study the NAA technique was used to determine the element concentration in whole blood samples of Golden Hamster. The elements Br, CL, K and Na were selected because they are very useful for clinical practice.

## EXPERIMENTAL PROCEDURE

For this study we collected whole blood samples of 7 adult female and 13 adult male Golden Hamster (*Mesocricetus Auratus*). Less than 0.1 ml of whole blood was collected from each animal and aliquots of 100  $\mu\text{L}$  (in duplicate) were immediately transferred to the filter paper and dried for a few minutes using an infrared lamp. To determine the concentration of the elements in the biological samples the Instrumental NAA technique was applied. The precision and the accuracy of the results were checked by analysis of the reference material NIST 8414 Bovine Muscle Powder. The samples and standards were irradiated in the IEA-R1 nuclear reactor at IPEN/SP (IEA-R1, 2-4 MW, pool type) for four minutes. The element concentrations were obtained using the in- house software package.

## RESULTS AND DISCUSSION

The concentrations of Br, Cl, K and Na in whole blood samples of Golden Hamster are shown in Table I. All of the results are a mean of duplicate analyses. The reference interval considering  $2\sigma$  (Standard deviation), the minimum and, the maximum values were also presented. The range for human whole blood reference interval was also included for comparison.

Table 1. The concentration of Br, Cl, K and Na in whole blood of Golden Hamster.

Elements	Mean (g L <sup>-1</sup> )	Minimum Value (g L <sup>-1</sup> )	Maximum Value (g L <sup>-1</sup> )	Reference Interval (g L <sup>-1</sup> )
Br	0.022 ± 0.002	0.012	0.036	0.008 – 0.036 < 0.0132 *
Cl	3.28 ± 0.16	2.19	4.25	2.14 – 4.42 2.01 – 3.33 *
K	2.32 ± 0.16	1.69	3.33	1.44 – 3.20 0.87 – 1.75 *
Na	2.02 ± 0.11	1.23	2.98	1.18 – 2.86 1.06 – 1.78 *

\* Reference Interval for humans (considering  $\pm 2\sigma$ ) [1].

Considering a confidence interval of 95%, usually adopted as a references for clinical practice, the mean value for Br, Cl, K and Na for Golden Hamster are in agreement with human whole blood reference interval [1], suggesting no physiological differences. However, the high Br and K levels suggest that these elements must be constantly evaluated during investigations using this animal model.

## CONCLUSION

The NAA technique can be an alternative procedure for clinical chemistry when small quantities of biological material are available. The knowledge of concentrations and their comparison with the results from human whole blood estimates allows for verification of the similarities or physiological differences. Besides, these results contribute to applications in veterinary medicine related to clinical analyses using whole blood.

## REFERENCE

1. L. C. Oliveira, C. B. Zamboni, J. Mesa Quantitative estimation of Br, Cl, K and Na in sample blood by NAA. Journal of Radioanalytical and Nuclear Chemistry. 269, 3(2006)541.

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